

- Fig. 7. Plasmodium of *Brefeldia maxima* parasitizing the mycelium of *Daedalea confragosa* on corn dextrose agar.
- Fig. 8. Plasmodium of *Lycogala epidendrum* attacking the hyphae of *Daedalea confragosa*.
- Fig. 9. Plasmodium of *Trichia decipiens* removing the mycelium of *Daedalea confragosa* from corn dextrose agar.
- Fig. 10. Plasmodium of *Badhamia magna* consuming the hyphae of *Fomes applanatus*.

NOTES

The Arnold Arboretum during the Fiscal year ended June 30, 1932.

CLIMATICALLY the year 1931-32 proved generally favorable to the growth and well-being of the collections. On February 4th, however, there was a heavy fall of snow that adhered to the trunks and limbs of trees and burdened shrubs and coniferous foliage with a thick mantle of white. Although the landscape effect was exceptionally beautiful in the Arboretum, much damage was done and several weeks had to be devoted to the pruning necessary to remove injured branches. In the spring the rainfall was plentiful and adequately supplied the needs of the plants for moisture. The Cherries and Rhododendrons produced an abundance of flowers and were exceptionally fine.

Now and again, usually through the unintentional carelessness of visitors, fires break out in the arboretum and threaten injury or destruction to valuable specimens. In the spring of 1932, several serious fires, a few doubtless of vandalistic origin, caused distressing damage. One of these menaced Hemlock Hill on April 30th, and before it was finally checked, had destroyed a plantation of Japanese Yews. It is evident that fire is an evil that must be controlled by the most efficient means if the work of years is not to be undone in a few minutes and losses incurred that can never be made good.

We continued our exchanges of plants, cuttings, grafts and seeds and during the year there were sent out 833 cuttings and grafts; 1997 plants and 941 packets of seeds. There were received from other institutions, 1666 plants, cuttings and grafts and 294 packets of seeds.

The publications of the Arboretum, the Journal and the Bulletin of Popular Information, were issued with customary regularity. Of the more than four hundred periodicals, bulletins and reports that come to the Library from all parts of the world, we receive 225 in exchange for our publications. In June the first issue of the new series to be known as Contributions from the Arnold Arboretum appeared, being The Hypodermataceae of Conifers

by Grant Dooks Darker. The second number of the Contributions is in the Press and the third number is under preparation and should be issued in 1933.

One thousand, one hundred and sixty-eight visitors registered at the Administration Building. They came from thirty-one of the United States, from Canada, China, Hawaii, Ireland, England, Egypt, and West Africa.

The "Harvard Experiment Station" situated near the city of Cienfuegos in Cuba, was originally associated with the Botanic Garden of the University under the supervision of the Director. It was founded by Mr. E. F. Atkins of Boston for the purpose of carrying on investigations looking toward the improvement of the varieties of sugar-cane and with the intention of assembling there a representative collection of tropical plants. As the enterprise became more and more closely associated with applied biology, it was transferred to the Bussey Institution of Applied Biology. Early in 1932, the Corporation voted to transfer the Station to the Arnold Arboretum with the title, "Atkins Institution of the Arnold Arboretum." In this regard it is worthy of note and record, that in 1926, Professor Sargent had looked favorably on a proposal to place the Cuban Station under the general control and management of the Arnold Arboretum and had assigned to Professor Jack the task of making a representative collection of the woody plants that grow in the vicinity of Cienfuegos. In recent years, Professor Jack has visited the Institution frequently and has given close attention to the introduction of Cuban woody plants to the living collections, while diligently working on the formation of an herbarium comprising the flora of the surrounding country.

At the end of this report there is appended a bibliography covering the publications of the staff and their students for the year ending June 30th, 1932. This bibliography indicates very clearly the wide extent and varied nature of the investigations that are receiving the attention of the Arboretum.—O. A.

Pathological Laboratory.—The Laboratory in Plant Pathology submits its report for 1931-2, making reference to improved facilities for investigation, extension service and research activities.

Pathological collections constitute an important equipment of our laboratory because they afford both subject matter for study and specimens for reference. Therefore, a consistent effort has been made to add to the materials required for a more comprehensive solution of our immediate research problems, and such as may be useful by way of illustration of as wide a range as possible of plant diseases comprised within the scope of our special field.

Liberal contributions have been received from correspondents, others have been obtained by exchange and many have been collected by members of the staff. Of the last named particular mention should be made of extensive accessions from Europe and America through G. D. Darker and from the western States and New England through J. H. Faull; the former are rich in "needle cast" fungi, the latter in coniferous rusts. Pertinent to this subject I am pleased to report a closer contact with the Farlow Library and Herbarium, recently initiated by the appointment of Arboretum representation on the Administration Board of that institution.

A second step forward in reference to improved facilities is the provision of laboratory accommodation made by the Corporation of Harvard University for research students working on the pathology of woody plants. While the Arboretum does not enroll research students nor regard itself as responsible for the financial support of their work, it does freely and gladly place its rich stores of plants and literature at their disposal, and offers direction in their investigations. Heretofore the students in pathology at the Arboretum have found laboratory space wherever made available through the courtesy of other departments. We now happily record appreciation of the splendid provision made for them in the new Biological Laboratories. They now have their own apparatus and laboratories, and at the same time they enjoy the distinct advantages of being in the centre of the scientific life of the University. During the year six of these research students have been cared for in the new quarters.

Each year brings its quota of requests from far and near for information on the diseases of forests and ornamental trees and shrubs, and the past year has been no exception in this respect. Many of these requests concern known troubles for which means of control are recognized, but occasionally they present subjects that cannot be disposed of offhand. Notably two problems of the latter type, suggested by correspondents, have been added to our program this year. One has to do with the "Gymnosporangium" diseases of Red Cedars, ornamental Apples, Hawthorns, etc., and the other with elm diseases. Grateful acknowledgment is made of material assistance afforded by Dr. and Mrs. Henry Lyman and Mrs. Harold Irving Pratt, respectively, towards the investigation of these problems.

Our investigative undertakings have in part found expression in publication (11 titles); others have not yet reached that stage. Important among the former is a study of the "needle cast" fungi of Conifers by Dr. G. D. Darker; the results, presented in the form

of a handsomely illustrated monograph, have been issued as No. 1 of "Contributions from the Arnold Arboretum of Harvard University." Twenty-four species are described as new, 10 on Firs, 3 on Spruces, and 11 on Pines; also the pathogenicity of 5 species, of a limited number tested, has been established by direct experimentation. Distinct progress has been made on the beech disease problem in which the sequent agencies of an insect and a fungus are involved (John Ehrlich: The Occurrence in the United States of *Cryptococcus Fagi* Dougl., the Insect Factor in a Menacing Disease of Beech. Journ. Arnold Arb. 13: 75-80. 1931). Successful control measures have been tested through the coöperation of the Boston Parks Department. Also field work in the Maritime Provinces, where the trouble has been devastating, is now in course of completion, an undertaking made possible through a liberal grant made by the National Research Council of Canada. Quoting Mr. Richard J. Hayden, Superintendent of Parks, Boston, Mass. from a recent article in Horticulture—"This insect (factor) is new and has not had time to become widespread here. Hence its early eradication may prevent the establishment of a very serious pest." Mention also should be made of the completion of Dr. K. S. Chester's studies on Phytophthora Blight of Lilacs, and of his rectification of an error in the technique, fundamentally important, used by certain investigators in the uncharted domain of plant immunology as a means of recognizing acquired immunity in plants. Dr. Chester will continue his studies during 1932-3 in Europe.

A list of other topics under investigation includes: rusts of Conifers; trunk diseases of Conifers; wilt diseases of Elms; spermogonia of rusts (L. M. Hunter); "cedar apple" diseases of Red Cedar, Apples, Hawthorns, etc. (I. H. Crowell and J. D. MacLachlan); mycorrhiza of trees (A. B. Hatch; Mr. Hatch's present field work in the Black Rock Forest, New York State, is fully supported by a contribution from an unnamed donor through the Director of the Harvard Forest).—J. H. F.

Cytology Laboratory.—During the past year additional cytological studies have been continued to determine the relation between chromosome numbers and taxonomic grouping in different species and genera of woody plants. The plants investigated include species and genera in the Ulmaceae, Tiliaceae, and Cornaceae, as well as a number of rare or monotypic genera. A study of chromosome behavior in several genera of conifers by Mrs. Sax has provided information which may account for the morphological stability of this group of plants. A comparison of the chromosomes of *Yucca and Agave*, in collaboration with Mrs. McKelvey, proves

that these genera are closely related, even though they have been placed in different families by most taxonomists.

Cytological investigations of hybrids have thrown some light on the relationships of geographically distinct species, and have indicated the probable origin of the Pomoideae.

Several studies on the mechanism of chromosome pairing and division have been completed during the year. This work is a part of a general project involving an extensive study of the mechanism of heredity. Collaborators in this work include Dr. Anderson, Dr. Hally J. Sax, Mr. Dermen, Mr. King, and Mr. O'Mara.

During the past season more than 350 crosses have been made between different species and varieties of trees and shrubs. Relatively few crosses between distinct species are successful, but the species hybrids obtained should be of considerable interest. The breeding work has resulted in species hybrids of *Syringa*, *Lilium*, *Malus*, *Philadelphus*, *Ulmus*, *Lonicera*, *Ribes*, and *Rosa*. Numerous crosses were made between *Rosa rugosa* and other species, many of which were successful. This work was aided by a special contribution from a friend of the Arboretum.—K. S.

The Herbarium.—The Herbarium contains 358503 specimens, 10022 having been added between July 1, 1931 and June 30, 1932. Of the accessions approximately 2750 came from the United States and Canada, 1670 from Central and South America inclusive of Mexico, 390 from Europe and Western and Central Asia, 1400 from Eastern Asia and 375 from Southern Asia and Malaysia, 260 from Africa, 1250 from Australasia and 1200 represented cultivated plants.

Among the more important collections received during the year are the following: more than 1000 numbers with many duplicates collected by S. F. Kajewski in the Solomon Islands and about 250 collected by him in North Queensland, 400 specimens of Tasmanian plants purchased from the Tasmanian Museum, 750 Chinese plants collected in Kweichou by Y. Tsiang and 425 Chinese Plants collected in western China by J. F. Rock, 400 plants from northern Burma collected by F. Kingdon Ward, 600 numbers with duplicates collected in Sumatra by W. N. and C. M. Bangham, 160 Philippine plants collected by C. A. Wenzel, 260 Central African plants collected by J. Burt Davy, 250 East African plants collected by H. Humbert, about 350 plants collected by G. Klug in Colombia (Putumayo River), 200 Brazilian plants from F. C. Hoehne, 520 Mexican plants from Stanford University, 220 numbers of Cuban plants with duplicates collected by J. G. Jack, and about 350 numbers of *Yuccas* with many duplicates collected by Mrs.

S. D. McKelvey, and with flowers and fruits in formaldehyde, cytological material, also insects pollinating the *Yucca* flowers.

The fruit collection numbers now 7439 specimens, 188 having been added during the year.

To the wood collection 83 specimens were added bringing the number up to 2365.

The collection of negatives of types and of other herbarium specimens consists now of 1857 negatives, 91 having been added during the year.

The installation of 16 new cases and 29 half-cases necessitated a rearrangement of the whole herbarium leaving space for accessions for a number of years. Besides constantly using the herbarium in the determination of plants sent in for identification and of some large collections chiefly from Eastern Asia and North America members of the staff have been engaged in special work; Dr. C. E. Kobuski has finished a revision of the Chinese species of *Jasminum* and Dr. Eva M. F. Roush is engaged in a similar revision of the genus *Eurya*, Dr. I. M. Johnston is continuing his work on the Boraginaceae, Mr. E. J. Palmer on the genus *Crataegus* and Mr. A. Rehder is continuing the revision of the ligneous plants described by H. Léveillé from Eastern Asia and the identification of collections of Chinese plants. Among visitors who have consulted the herbarium may be mentioned Dr. F. P. Metcalf of Lingnan University, Canton, China, Dr. E. D. Merrill of the New York Botanical Garden, Dr. S. F. Blake of the Department of Agriculture and Dr. R. E. Woodson of the Missouri Botanical Garden.

For study outside the Arboretum 931 specimens were sent on loan to institutions and individuals in this country and in Europe.

There have been distributed 22037 specimens to 40 institutions in the United States, Canada, Europe, Asia, Africa and Australia.

Botanical exploration by members of the staff or by expeditions partly financed by the Arnold Arboretum has been carried on in both Americas, Eastern Asia and Australia.

Mrs. Susan Delano McKelvey travelled from the middle of March to the end of May about 11000 miles in Texas, New Mexico, Arizona, California and Oklahoma for the purpose of studying and collecting *Yucca*; she obtained in addition to 350 herbarium specimens and 250 specimens of flowers and fruits in formaldehyde solution, about 100 numbers of chromosome material and 50 numbers of pollen smears, 125 numbers of entomological specimens including nearly 2000 *Yucca* moths and 100 excellent photographs.

Professor J. G. Jack spent the month of August 1931 and the months of February and March 1932 at the Harvard Tropical

Garden at Soledad, Cuba, and collected in the Garden and in the surrounding country about 4500 sheets of herbarium material besides wood specimens and seeds.

Mr. E. J. Palmer with Dr. Edgar Anderson collected during the month of April 1932 in the Atlantic coast region from New Jersey to Georgia, Mr. Palmer paying special attention to *Crataegus*.

Dr. H. M. Raup and Mr. E. C. Abbe started in June 1932 on a tour of botanical exploration of the Peace River region in the provinces of Alberta and British Columbia.

From March 1930 to May 1932 Mr. S. F. Kajewski has made extensive collections in the Solomon Islands and has collected more than 1000 numbers with numerous duplicates. Professor Albert N. Steward and Professor C. Y. Chiao of the University of Nanking undertook an expedition to the province of Kweichow from the end of June to November 1931 which proved very successful; an expedition to Kwangsi planned for 1932 had to be abandoned on account of the Sino-Japanese conflict in the spring of this year; it will probably take place next year. Professor H. H. Hu of the Fan Memorial Institute of Biology in Peiping sent his collector, Mr. F. T. Wang, to Szechuan during the summer of 1931 but owing to troubled conditions in that province the expedition was not quite as successful as was expected, though about 1000 numbers with duplicates were collected; this year the botanical exploration of Szechuan will be continued and probably extended into Yunnan. Mr. R. Goerz returned in August 1931 from his collecting tour into northeastern Asia Minor. G. Looser, a resident of Santiago, Chile, made a collecting tour in December 1931 to southern Coquimbo which is botanically almost unexplored.—A. R.

The Library.—Additions to the Library during the past year include 878 volumes, 205 pamphlets and 321 photographs, making a total of 40,648 bound volumes, 9,885 pamphlets and 16,786 photographs. Among the photographs are nearly 200 taken in the Arboretum during the spring and summer of 1931 by Mr. Herbert W. Gleason, about 100 taken by Mr. E. J. Palmer in the South and Middle West, 7 of the Bird Sanctuary at Lake Wales, Florida, including a large colored print of the Bok Singing Tower, the gift of Mrs. Edward Bok, 4 of Chinsegut Hill, Brooksville, Florida, the gift of Colonel and Mrs. Raymond Robins, and 80 post cards of "British trees published by the British Museum (Natural History)." To our collection of original drawings and water colors have been added by gift a beautiful water color of *Dendrobium Wardianum* by Mrs. Oakes Ames and an *Echeveria* by Miss M. A. Eaton, and by purchase 58 sheets of water color drawings recording with delicate

accuracy the many varieties of color and shading in Azaleas and Rhododendrons, by Mr. C. H. L. Gebfert.

Cards filed during the year include 1,200 in the Catalogue of books in the Library, 350 in the Catalogue of photographs, 5,446 in the "Card-index of New Genera, Species and Varieties published by the Gray Herbarium," and 3,827 in the manuscript "Index of Illustrations and of New Genera, Species and Varieties of Ligneous Plants published since 1915" prepared at the Arboretum.

In addition to the cards filed nearly 4,000 slips have been prepared and filed for the printed "Catalogue of the Library," which is now making satisfactory progress after a long delay due to unforeseen circumstances.

Five hundred and seventy volumes, including periodicals, have been bound, while about 100 smaller books and pamphlets have been put into pamphlet binders.

The growth of the library and the increase in the number of persons using it have made necessary a large undertaking considered in former years unnecessary and disfiguring—placing book numbers on the back of the bindings. Much of this work has been done during the past year and has proved a great saving of time and effort as well as a means of locating books out of place, misplaced books being inevitable with shelves open to staff and visitors.

During the year a number of research workers have made use of the unusual facilities which the library affords, especially in Chinese literature. Dr. Franklin P. Metcalf of Lingnan University, Canton, China, left about the middle of September after nearly two years' study in the library and herbarium, preparing a Flora of Fukien. Dr. S. F. Blake of the United States Department of Agriculture spent some days examining the books on the floras of the world. Among other visitors using the library were Mr. Ahmed Hilmy, under the auspices of the Egyptian Legation, research workers from Arthur D. Little, Inc., and the United Fruit Company.

The number of new periodicals received during the year is rather larger than usual, many coming in exchange for the "Journal of the Arnold Arboretum," the "Arnold Arboretum Bulletin of Miscellaneous Information," "Contributions from the Arnold Arboretum of Harvard University," and for herbarium specimens, some by gift and a number by purchase. They are:

ACTA phaenologica. Deel i, afl. 1 → 's-Gravenhage. 1931 →

ACTA phytogeographica suecica. 1 → Uppsala. 1929 →

ACTA phytotaxonomica et geobotanica. Vol. i, no. 1 → Kyoto.
1932 →

ANNALES sabarienses: folia musealia. i. Szombathely. 1932.

- ARCHIVOS de botanica do estado de S. Paulo. Vol. i, fasc. 1 → São Paulo. 1925 →
- AUCKLAND INSTITUTE AND MUSEUM. Records. Vol. i, no. 2. [Auckland.] 1931.
- BLACK ROCK FOREST. Bulletin. No. 1 → Cornwall-on-the-Hudson. 1930 →
- BUENOS AIRES—*Universidad*. Revista de la Facultad de agronomía y veterinaria. Tomo vii, entrega 1 → Buenos Aires. 1930 →
- BUTANTAN, *Brazil*—*Instituto soroterapico*. Anexos das Memórias do Instituto de Butantan, Secção de botanica. Vol. i, fasc. 1-6. São Paulo. 1921-22.
- CAVANILLESIA. Vol. i, fasc. 1 → Barcinone. 1928 →
- CRACOW, *Poland*—*Universytet jagiellonski*. Publicationes Instituti botanici. Nr. 1-8. Cracovie, etc. 1931.
- DIFESA delle piante contro le malattie ed i parassiti. Anno ix, n. 1-3. Torino. 1932.
- GRAND CANYON nature notes. Vol. v, no. 6, 8-10, 12; vi, 1 → [Grand Canyon.] 1931-32 →
- HARVARD UNIVERSITY—*Botanical museum*. Botanical museum leaflets. No. 1 → Cambridge. 1932 →
- HONG KONG naturalist. Vol. i, no. 1 → Hong Kong. 1930 →
- LEAFLETS of western botany. Vol. i, no. 1 → San Francisco. 1932 →
- LYONS—*Société botanique*. Nouveau bulletin. Année i, no. 1-4. Lyon. 1913.
- MESA VERDE notes. Vol. ii, no. 1 → [Mancos, Colo. 1931] →
- NATURE. Vol. 129, no. 3244 → London. 1932 →
- PHYSIS. Tomo i → Buenos Aires. 1912 →
- SOCIEDADE BROTERIANA. Memorias. Vol. i → Coimbra. 1930 →
- SOCIETÀ INTERNAZIONALE DI MICROBIOLOGIA—*Sezione italiana, Milan*. Bollettino. Vol. iv, fasc. 1 → Milan. [1932] →
- SOUTH AFRICA—*Botanical survey*. Memoir 1 → Pretoria. 1919 →
- SUIGEN, *Korea*—*Agricultural and forestry college*. Bulletin. No. 1-3. Suigen. 1925-28.
- SYMBOLAE botanicae upsalienses. i → Uppsala. [1932] →
- TAIHOKU IMPERIAL UNIVERSITY—*Herbarium*. Contributions. No. 1 → [Taihoku] 1930 →
- UTRECHT—*Rijks universiteit*—*Botanisch museum en herbarium*. Mededeelingen. No. 1 → Amsterdam. 1932 →

Among other important accessions are:

- KNIPHOF, J. H. Botanica in originali. 12 cent. (in 6 vol.). Halae Magdeburgicae. 1758['57]-64. 1200 hand-colored plates.

- GRABOWSKI, H. E. Flora von Ober-Schlesien. Breslau. 1843. [RIOCREUX, Alfred. Collection of 87 original drawings. 1860.]—Beautifully tooled green leather binding. Purchased from the income of the Mary Robeson Sargent fund.
- THUNBERG, C. P. Nova genera plantarum. Upsaliae. [1781–1801.]
- HU, H. H. Enumeration of plants in Chekiang. [Peiping. 1930?]
—Gift of the author.
- LEUDERS, P. E. Etwas vom coffee. [Glucksburg. 1784.]
- VALLET, Pierre. Le jardin du roy tres chrestien Henry IV roy de France et de Navare. [Paris.] 1608. 73 plates before numbers.—Unbound, in half green morocco book-box.
- AMMANN, Paul. Character plantarum naturalis, à fine ultimo videlicet fructificatione desumptus, ac præmisso fundamento methodi genuinæ cognoscendi plantas, per canones et exempla digestus. Francofurti; Lipsiæ, apud Nicol. Scipionem. 1685.
- BATSCH, A. J. G. K. Versuch einer anleitung zur kenntniss und geschichte der pflanzen für academische vorlesungen entworfen und mit den nöthigsten abbildungen versehen. 2 theile. Halle. 1787–88. 11 plates.
- M'MAHON, Bernard. A catalogue of garden, grass, herb, flower, tree & shrub-seeds, flower-roots, & sold by Bernard M'Mahon, seedsman. [Philadelphia? 1800?]
—A photostatic copy of one of the oldest American nursery catalogues. Gift of Mr. E. C. Vick.
- [AMES, Oakes. Original manuscript of new species, "New combinations and additions to the orchid flora of the Philippines," prepared for fasc. v of his "Orchidaceae" in 1914–15.]
—Gift of the author.
- MUELLER, Johann Sebastian (afterwards John MILLER). Illustratio systematis sexualis Linnæi. London. 1777 ['70–77]. f°. 104 plates, and engraved title-page. (4 colored plates inserted.)
——— Another copy of the 104 plates, colored by hand, without title or text.
- LINK, H. F. Icones plantarum selectarum Horti regii botanici berolinensis. Auctoribus H. F. Link et F. Otto. Fasc. i–x (in 1 vol.). Berolini. 1820–28. 60 colored plates.
- MORICAND, Stephano. Plantae americanæ rariores. Genève. 1830. 10 plates.
- SCHLEICHER, J. C. Catalogus plantarum in Helvetia cis-et transalpina sponte nascentium. Bex. [1800.]
——— *The same.* [Bex.] 1807.

VALMONT DE BOMARE. Dictionnaire raisonné universel d'histoire naturelle. 5 tom. Paris. 1764.

REICHENBACH, H. G. L. Repertorium herbarii. Dresdae et Lipsiae. 1841. (Der deutscher botaniker, 1.)

FUCHS, Remacleus. Plantarum omnium, quarum hodie apud pharmacopolas usus est magis frequens nomenclaturæ juxta grecorum, latinorū, gallo., itolorū, hispa & germa. sententiam. Parisiis. 1541.—Very rare, first edition of the first botanical work by the first Belgic writer. Purchased from the income of the Mary Robeson Sargent fund.

RINALDI, Giovanni de. Il mostruosissimo mostro, nel secundo si tratta dell'herbe, & fiori.—Pritzel 7634: "Liber rarissimus." Apparently first and unique edition. The second part of this peculiar work is of botanical interest and treats of the symbolic signification of flowers in old literature. An early dictionary of language of flowers—a most curious and uncommon tract, also of folkloristical interest. This little work is very scarce. Gift of Mrs. Sarah C. Sears.

EHRHART, Balthasar. Oekonomische pflanzenhistoire. 2^e verbesserte aufl. 12 teile (in 4 vol.). Ulm und Mèmmingen. 1756, '53-62.

MÖLLENDORFF, P. G. & O. F. Manual of Chinese bibliography; being a list of works and essays relating to China. Shanghai. 1876.

CORRÊA, Pio. Diccionario das plantas uteis do Brasil e das exoticas cultivadas. Vol. i, ii. Rio de Janeiro. 1926-31. Illustr. [BRUNFELS, Otto.] In Dioscoridis historiam herbarum certissima adaptatio. Argentorati. 1543. Wdcts.—Extremely rare edition. A contemporary ownership note on the fly-leaf states that this belonged to Giustiniani Paoluccelli, that it was bought at Venice, and bound at Padua in 1545.

SASAKI, Syun'iti. A catalogue of the government herbarium. Taihoku. 1930. (Formosa—Department of forestry.)

WILSON, H. W., COMPANY. Union list of serials in libraries of the United States and Canada. Supplement. Jan. 1925-June, 1931. New York. 1931.

A large number of books were sent out as inter-library loans to Arthur D. Little, Inc., Marine Biological Laboratory, Bussey Institution of Applied Biology, Yale University, Massachusetts Institute of Technology, Harvard Forest, Harvard College, Harvard Medical School, University of Minnesota, New York State College of Agriculture, United States Department of Agriculture, Massachusetts Horticultural Society, Gray Herbarium, Lowthorpe School,

Ohio State University, Laselle Seminary, Smith College, Olmsted Brothers, University of New Hampshire, Massachusetts Agricultural College, Canada Department of Mines, Harvard Museum of Comparative Zoology and other institutions. Sixty seven photographs were loaned to the Royal Horticultural Society for the Conifer conference of 1931. A few books were borrowed.

The library has been fortunate in being able to make up from odd numbers and oversheets, with the aid of a few photostatic reproductions, several copies of the "Silva of North America" by C. S. Sargent. With the exception of one copy these have been sold. At the same time several complete sets of the plates were made in Paris, and may be purchased from the library. They would make a valuable addition to any botanical library or herbarium.

The library has also sold 1,972 photographs taken by the late Dr. E. H. Wilson in China, Japan, Australasia, India and Africa, and many other photographs.—E. M. T.

Bibliography of the published writings of the staff and students July 1, 1931—June 30, 1932

ABBE, Ernst C.

Chromosome numbers and the anatomy of the secondary xylem in the Oleaceae. [By] Karl Sax and Ernst C. Abbe. (In *Journal of the Arnold arboretum*, 1932, xiii, 37-48.)

AMES, Oakes.

The Arnold arboretum; [report 1930-31]. (In *Journal of the Arnold arboretum*, 1931, xii, 296-297.)

Juniperus virginiana growing on a rock. (In *Arnold arboretum bulletin of popular information*, 1931, v, 62-64.)

Orchidaceae [of the Tyler-Duida expedition]. By Oakes Ames and Charles Schweinfurth. (In *Bulletin of the Torrey botanical club*, 1931, lviii, 345-353.)

Additions to the orchid flora of the United States. (In *Proceedings of the Biological society of Washington*, 1932, xlv, 3-4.)

Contributions to the flora of the New Hebrides and Santa Cruz Islands; orchids collected by S. F. Kajewski in 1928 and 1929. (In *Journal of the Arnold arboretum*, 1932, xiii, 127-141.)

A new *Bletia* from Honduras. (In *Proceedings of the Biological society of Washington*, 1932, xlv, 1-2.)

A new *Epidendrum* from Spanish Honduras. (In *Harvard university, Botanical museum leaflets*, 1932, no. 2, pp. 1-3.)

A new genus of the Orchidaceae from the New Hebrides. (In *Journal of the Arnold arboretum*, 1932, xiii, 142-144.)

New or noteworthy Philippine orchids. ii. By Oakes Ames and Eduardo Quisumbing. (In *Philippine journal of science*, 1932, xlvii, 197-220.)

Two new orchids from Yucatan and Trinidad. By Oakes Ames and Charles Schweinfurth. (In *Harvard university, Botanical museum leaflets*, 1932, no. 2, pp. 4-7.)

ANDERSON, Edgar.

The art of budding. By Edgar Anderson and W. H. Judd. (In *Arnold arboretum bulletin of popular information*, 1931, v, 49-52.)

The chromosome complements of *Allium stellatum* and *Nothoscordum bivalve*. (In *Annals of the Missouri botanical garden*, 1931, xviii, 465-468.)

Hybrid trees. (In *Arnold arboretum bulletin of popular information*, 1931, v, 65-68.)

Species hybrids in *Aquilegia*. By Edgar Anderson and Brenhilda Schafer. (In *Annals of botany*, 1931, xlv, 639-646.)

Baltic ivy. (In *Arnold arboretum bulletin of popular information*, 1932, vi, 1-6.)

Character recombination in *Drosophila*. (In *Proceedings of the National academy of sciences*, 1932, xviii, 427-429.)

Contributions to the *Tradescantia* problem. By Edgar Anderson and D. G. Diehl. (In *Journal of the Arnold arboretum*, 1932, xiii, 213-231.)

Fire! (In *Arnold arboretum bulletin of popular information*, 1932, vi, 21-24.)

How big is a cell? (In *Science*, 1932, lxxv, 359.)

Rosa rugosa and its hybrids. By Edgar Anderson and W. H. Judd. (In *Arnold arboretum bulletin of popular information*, 1932, vi, 29-35.)

BENNETT, Elizabeth Dean.

Arboreta and botanic gardens in the United States. (In *Arnold arboretum bulletin of popular information*, 1931, v, 53-60.)

Bibliography of the published writings of the staff and students [of the Arnold arboretum], July 1, 1930-June 30, 1931. (In *Journal of the Arnold arboretum*, 1931, xii, 305-307.)

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The above articles cover a total of about 615 pages.

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